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ELECTROMAGNETIC INSPECTION OF WIRE ROPES USING SENSOR
ARRAYS(U) NDT TECHNOLOGIES INC SOUTH WINDSOR CT
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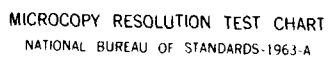
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ELECTROMAGNETIC INSPECTION OF WIRE ROPES USING SENSOR ARRAYS

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5 November 1984

Quarterly Progress Report for Period
16 June 1984 - 15 September

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Prepared for

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DEPARTMENT OF THE NAVY
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Arlington, Virginia 22217

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QUARTERLY PROGRESS REPORT

16 June 1984 - 15 September 1984

During the time period from 16 June 1984 thru 15 September 1984, we achieved the following:

- o Instrument for the Inspection of Wire Rope End Sections, We performed a first experimental investigation of the proposed instrumentation for the inspection of wire rope end sections. These experiments revealed some problems, caused by the greatly distorted magnetic field close to the rope termination socket. However, an instrument of this type appears feasible.

We expanded the computer coil simulation program to study the magnetic end effects caused by the rope terminations. The program is now useful to gain a better understanding of these phenomena.

- o Instrument Calibration, We studied the problem of instrument calibration. We designed a new automatic calibration procedure, including circuit hardware, which is easy to use. The calibration procedure will allow a reading of a rope's loss of metallic cross-sectional area as a percentage of the rope's total metallic cross-sectional area. We are presently implementing this automatic calibration circuit.



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- o Remagnetization Effect. We designed and built a new prototype of our LMA/LF instruments. It has a significantly reduced remagnetization effect, confirming our previous hypotheses on the remagnetization phenomenon. The new prototype uses additional permanent magnets which makes the instrument bulkier, heavier and more expensive. Since the remagnetization effect can be simply eliminated by magnetically homogenizing the rope before an inspection, the benefits of this new design are open to discussion and should be verified in further field experiments.
- o Mechanical Position Transducer. We designed and implemented a mechanical rotating position transducer of the conventional design. This footage counter is based on an optical encoder. Except for minor mechanical changes, the design is complete and a prototype is available. We are presently manufacturing a second prototype.
- o Strand Counter. We implemented an experimental prototype of a rope strand counter which can be used to determine the exact location of a flaw by counting strands along the rope. The strand counter uses no moving mechanical parts. It is a simple and rugged alternative to a rotating transducer. However, it can be used only for stranded ropes, and, because the lay length varies for different ropes, the determination of actual rope length and speed is somewhat complicated.

- o Data Acquisition System, We improved the frequency modulation-demodulation circuit required for signal recording by magnetic tape. A regular stereo magnetic tape deck can now be used for recording the LMA and LF signal together with the distance marker signal. An additional signal channel could also be made available, if required.
- o Integrator Circuit, We improved the basic integrator circuit. The circuit is now easy and convenient to balance. The inevitable integrator drift was further reduced to a point where it is now completely negligible. For less demanding applications, we simplified the integrator circuit. Balancing in these cases is no longer necessary, with only a slight compromise in performance.
- o Annual Report Except for some drawings which have to be finalized, the Annual Report is complete. It will be delivered in the second part of November.

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